

WHAT IS CLAIMED IS:

1. An internal power supply voltage generation circuit comprising:

comparison circuitry for providing a signal according to a difference between an internal power supply voltage on an internal power supply line and a reference voltage from an output node thereof;

a current drive element coupled between an external voltage source supplying an externally applied external power supply voltage and said internal power supply line, and responsive to the signal from the output node of said comparator circuitry for causing a current flow between said external voltage source and said internal power supply line; and

level adjust circuitry for adjusting a voltage level of the signal applied from the output node of said comparator circuitry to said current drive element in accordance with the difference between said external power supply voltage and said reference voltage.

2. The internal power supply voltage generation circuit according to claim 1, wherein said level adjust circuitry comprises means for setting the voltage level of the signal applied from the output node of said comparator

5 circuitry to said current drive element to a level that increases an amount of current supplied by said current drive element when the difference between said external power supply voltage and said reference voltage becomes smaller than or equal to a predetermined value.

3. The internal power supply voltage generation circuit according to claim 1, wherein

5 said current drive element comprises a p channel insulated gate field effect transistor receiving the signal from the output node of said comparator circuitry at a gate thereof, and

10 said level adjust circuitry comprises means for driving the signal applied from the output node of said comparator circuitry to the gate of said p channel insulated gate field effect transistor toward a ground voltage level when the difference between said external power supply voltage and said reference voltage becomes smaller than or equal to a predetermined value.

4. The internal power supply voltage generation circuit according to claim 1, wherein

5 said current drive element comprises a p channel insulated gate field effect transistor receiving the signal from the output node of said comparator circuitry

at a gate thereof, and

10 said level adjust circuitry comprises means for
pulling down the signal applied to the gate of said p.
channel insulated gate field effect transistor from the
output node of said comparator circuitry to a
predetermined voltage level between said internal power
supply voltage and a ground voltage when the difference
between said external power supply voltage and said
15 reference voltage becomes smaller than or equal to a
predetermined value.

5. An internal power supply voltage generation
circuit comprising:

comparator circuitry for providing a signal according
to a difference between an internal power supply voltage
5 on an internal power supply line and a reference voltage;

a current drive element coupled between an external
voltage source supplying an externally applied power
supply voltage and said internal power supply line, and
responsive to an output signal of said comparator
10 circuitry for causing a current flow between said external
voltage source and said internal power supply line;

level adjust circuitry for providing a signal
according to a difference between said external power
supply voltage and said reference voltage; and

15 an auxiliary drive element coupled in parallel to
said current drive element between said external voltage
source and said internal power supply line, for causing a
current flow between said external voltage source and said
internal power supply line in accordance with the signal
20 output from said level adjust circuitry.

6. The internal power supply voltage generation
circuit according to claim 5, wherein said level adjust
circuitry comprises means for rendering said auxiliary
drive element conductive when the difference between said
5 external power supply voltage and said reference voltage
becomes smaller than or equal to a predetermined value.

7. The internal power supply voltage generation
circuit according to claim 5, wherein

said auxiliary drive element comprises a p channel
insulated gate field effect transistor, and

5 said level adjust circuitry comprises means for
driving a gate of said p channel insulated gate field
effect transistor toward a ground voltage level when the
difference between said external power supply voltage and
said reference voltage becomes smaller than or equal to a
10 predetermined value.

8. The internal power supply voltage generation circuit according to claim 5, wherein

said auxiliary drive element comprises a p channel insulation gate field effect transistor, and

5 said level adjust circuitry comprises means for driving a gate of said p channel insulated gate field effect transistor to an intermediate voltage level between said internal power supply voltage and said reference voltage when the difference between said external power
10 supply voltage and said reference voltage becomes smaller than or equal to a predetermined value.

9. The internal power supply voltage generation circuit according to claim 1, wherein said level adjust circuitry is activated in response to a signal indicating an activation of internal circuitry using the internal
5 power supply voltage on said internal power supply line is active.

10. The internal power supply voltage generation circuit according to claim 5, wherein said level adjust circuitry is activated when a signal indicating an activation of internal circuitry using the internal power
5 supply voltage on said internal power supply line is active.

11. The internal power supply voltage generation circuit according to claim 1, wherein said level adjust circuitry comprises

a comparator stage including (i) a first insulated gate field effect transistor receiving said external power supply voltage at a gate thereof, and (ii) a second insulated gate field effect transistor having a current supply ability greater than a current supply ability of said first insulated gate field effect transistor under a condition of the same gate voltage and receiving said reference voltage at a gate thereof for comparing said external power supply voltage and said reference voltage, and

a current mirror type current supply stage for supplying a current to said comparator stage.

12. The internal power supply voltage generation circuit according to claim 5, wherein said level adjust circuitry comprises

a comparator stage including (i) a first insulation gate field effect transistor receiving said external power supply voltage at a gate thereof, and (ii) a second insulated gate field effect transistor having a current supply ability greater than a current supply ability of said first insulated gate field effect transistor under a

10 condition of the same gate voltage and receiving said
reference voltage at a gate thereof, for comparing said
external power supply voltage and said reference voltage,
and

15 a current mirror type current supply stage for
supplying a current to said comparator stage.

13. The internal power supply voltage generation
circuit according to claim 11, wherein said level adjust
circuitry further comprises means for amplifying a signal
indicating a comparison result from said comparator stage.

14. The internal power supply voltage generation
circuit according to claim 12, wherein said level adjust
circuitry further comprises means for amplifying a signal
indicating a comparison result from said comparator stage.

15. The internal power supply voltage generation
circuit according to claim 5, wherein said auxiliary drive
element is smaller in current drivability than said
current drive element.

16. The internal power supply voltage generation
circuit according to claim 1, wherein said comparison
circuitry includes;

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a level shifter for level-shifting said internal
5 power supply voltage, and

a comparator for comparing the level-shifted internal
power supply voltage and said reference voltage to produce
the signal from said output node in accordance with the
result of comparison.

17. The internal power supply voltage generation
circuit according to claim 5, wherein said comparison
circuitry includes,

a level shifter for level-shifting said internal
5 power supply voltage, and

a comparator for comparing the level-shifted internal
power supply voltage and said reference voltage to produce
the signal from said output node in accordance with the
result of comparison.

18. An internal power supply voltage generation
circuit comprising:

comparison circuitry for comparing a reference
voltage and a voltage corresponding to an internal power
5 supply voltage on an internal power supply line to produce
a signal according to a difference between said reference
voltage and the internal power supply voltage;

current supply circuitry coupled between an external

power supply node receiving and supplying an external
10 power supply voltage and said internal power supply line
for causing a current flow from said external power supply
node to said internal power supply line in response to the
signal from said comparison circuitry; and

level adjusting circuitry for comparing the external
15 power supply voltage and said reference voltage to
forcibly increasing a current flow supplied by said
current supply circuitry when a difference between the
external power supply voltage and the reference voltage is
smaller than or equal to a predetermined value.